University of Gdańsk

Subject card

Subject name and code	Quantitative analysis methods in medicine and cosmetics, PG_00051162						
Field of study	Chemistry						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2026/2027			
Education level	Bachelor's studies		Subject group	Optional subject group			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	3		Language of instruction	Polish			
Semester of study	5		ECTS credits	1.0			
Learning profile	academic		Assessment form	credit			
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Dorota Zarzeczańska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	15		2.0		8.0	25
Subject objectives	• To familiarize students with methods of collecting and describing samples for quantitative analysis. • Presentation of the principles of quantitative determination of compounds used in cosmetics and medicine. • Discussion of advanced methods used in the quantitative analysis of organic and inorganic compounds. • Developing the ability to independently conduct complex quantitative analyzes of commercial substances.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[CHEML3_W05] Has basic knowledge of the chemical specialisation studied.	The student determines the properties of solvents used in pharmaceutical and cosmetic analysis and characterizes the methods of analyzing chemical compounds.	[SW4] test/exam - oral or written
[CHEML3_U01] Identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge.	The student recognizes and defines various types of titration methods and identifies and solves problems related to quantitative analysis.	[SU4] test/exam - oral or written
[CHEML3_W10] Enumerates and describes the basic aspects of the construction, operation and use of measuring apparatus and equipment used in experimental works in the field of chemistry and related sciences.	The student distinguishes, selects and uses appropriate glass and equipment for a given quantitative analysis.	[SW4] test/exam - oral or written
[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	The student independently prepares and documents the quantitative analysis of substances contained in cosmetic and pharmaceutical preparations.	[SU3] text preparation/written work [SU4] test/exam - oral or written
[CHEML3_U02] Performs analyses using experimental methods and draws conclusions based on them.	The student knows the theoretical basis for performing quantitative analyzes using experimental methods and is able to formulate conclusions based on the results.	[SU4] test/exam - oral or written
[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	The student recognises, selects, and uses appropriate equipment and laboratory equipment to perform quantitative analyses.	[SU4] test/exam - oral or written
[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	The student knows and characterizes various methods of analyzing chemical compounds used in medicine and cosmetics.	[SW4] test/exam - oral or written
[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	The student presents the principles of collecting and preparing samples for quantitative analysis and knows the analysis methods used in medicine and cosmetics.	[SW4] test/exam - oral or written
[CHEML3_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.	The student recognizes and predicts the sources of errors occurring during quantitative analysis and follows occupational health and safety rules in the laboratory.	[SK1] oral statement/conversation/ discussion
[CHEML3_U05] Uses basic statistical methods and IT techniques to describe chemical processes and analyse experimental data.	The student performs calculations to determine the content of substances in a cosmetic or pharmaceutical preparation, using statistical methods.	[SU4] test/exam - oral or written

Subject contents

General principles of sampling, with particular emphasis on cosmetic samples. Sampling of gases, liquids, solids. Grinding and reducing samples. Sample decomposition: wet methods, fusion with fluxes, mineralization of organic samples. Precipitation methods, separation of traces using carriers. Extraction. Methods based on substance volatility: simple distillation and sublimation. Ion exchange. General principles of gas meter analysis. Types of titration methods (direct, indirect and inverse). Alkalimetric analysis of multifunctional acids and bases. Methods for quantitative determination of strong and weak acids in aqueous, non-aqueous and mixed media. Analysis of errors in analytical methods. Assessment of analysis results: accuracy, precision, sensitivity, errors, range (dispersion) of results. Standardization and assessment of the reliability of analytical methods. Examples of titration determinations in national and international standards. Quantitative determination of ingredients of cosmetic products and substances used in medicine.

Prerequisites and co-requisites

Completed general chemistry and analytical chemistry courses.Using laboratory glass suitable for quantitative analysis and applying the principles of work in a chemical laboratory, using chemical calculations in the quantitative determination of substances, describing equilibria in a solution using chemical reactions, balancing oxidation-reduction reactions, theoretical basis of quantitative determinations used in analytical chemistry, ability to independently conducting basic analyzes using quantitative methods

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	51.0%	100.0%

Recommended reading	Basic literature	• J. Minczewski i Z. Marczenko, Chemia analityczna 2. PWN, Warszawa 2004; • T. Lipiec, Z.S. Szmal, Chemia analityczna z elementami analizy instrumentalnej, PZWL, Warszawa 1996; • A. Persona, Chemia analityczna, Podstawy klasycznej analizy ilościowej, Medyk, Warszawa 2007 • M. Jarosza Nowoczesne techniki analityczne PWN Warszawa 2006
	Supplementary literature	• Z. Brzózka Miniaturyzacja w analityce chemicznej PWN 2005 • A. Cygański, Chemiczne metody analizy ilościowej, WNT • D. Harvey, Modern Analytical Chemistry, McGraw Hill Companies, Inc.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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